FINAL SITE INSPECTION PRIORITIZATION REPORT

QUINN, K. J. & COMPANY, INC.

SEABROOK, NEW HAMPSHIRE

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY NEW ENGLAND
Office of Site Remediation and Restoration
Boston, MA

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

Stone & Webster Environmental Technology & Services (S&W) was requested by the U.S. Environmental Protection Agency New England (EPA - New England) Office of Site Remediation and Restoration to perform a Site Inspection Prioritization (SIP) of the Quinn, K.J. & Co., Inc. site in Seabrook, New Hampshire. Note that the site is listed as Quinn, K.J. & Co., Inc. in CERCLIS, but is referred to as K.J. Quinn in this report. All tasks were conducted in accordance with the New England Corps of Engineers Contract No. DACW33-94-D-0007, which was issued to S&W on December 30, 1994. A Preliminary Assessment (PA) of the K.J. Quinn site was performed by the New Hampshire Bureau of Solid Waste Management in 1980. A Screening Site Inspection (SSI) was completed by TRC Companies, Inc. (TRCC) in 1991 for the Region I EPA. Updated information since the last EPA activity encountered during the SIP process is included in this report. Relevant text from the SSI report is presented in this report in italics.

Background information used in the generation of this report was obtained through:

File searches conducted at the New Hampshire Department of Environmental Services (NHDES), and the Seabrook, New Hampshire Town Hall;

Telephone interviews with the Salisbury Water Supply Co.;

Information obtained through computer database searches;

Conversations with other federal, state, and local agencies; and

S&W's onsite reconnaissance on May 8, 1995.

This package follows guidelines developed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA regulations, such as those under the Resource Conservation and Recovery Act (RCRA) or other federal, state, and local regulations. An SIP is intended to provide a preliminary screening of sites to facilitate EPA's assignment of site priorities. It is a limited effort, and is not intended to supersede more detailed investigations.

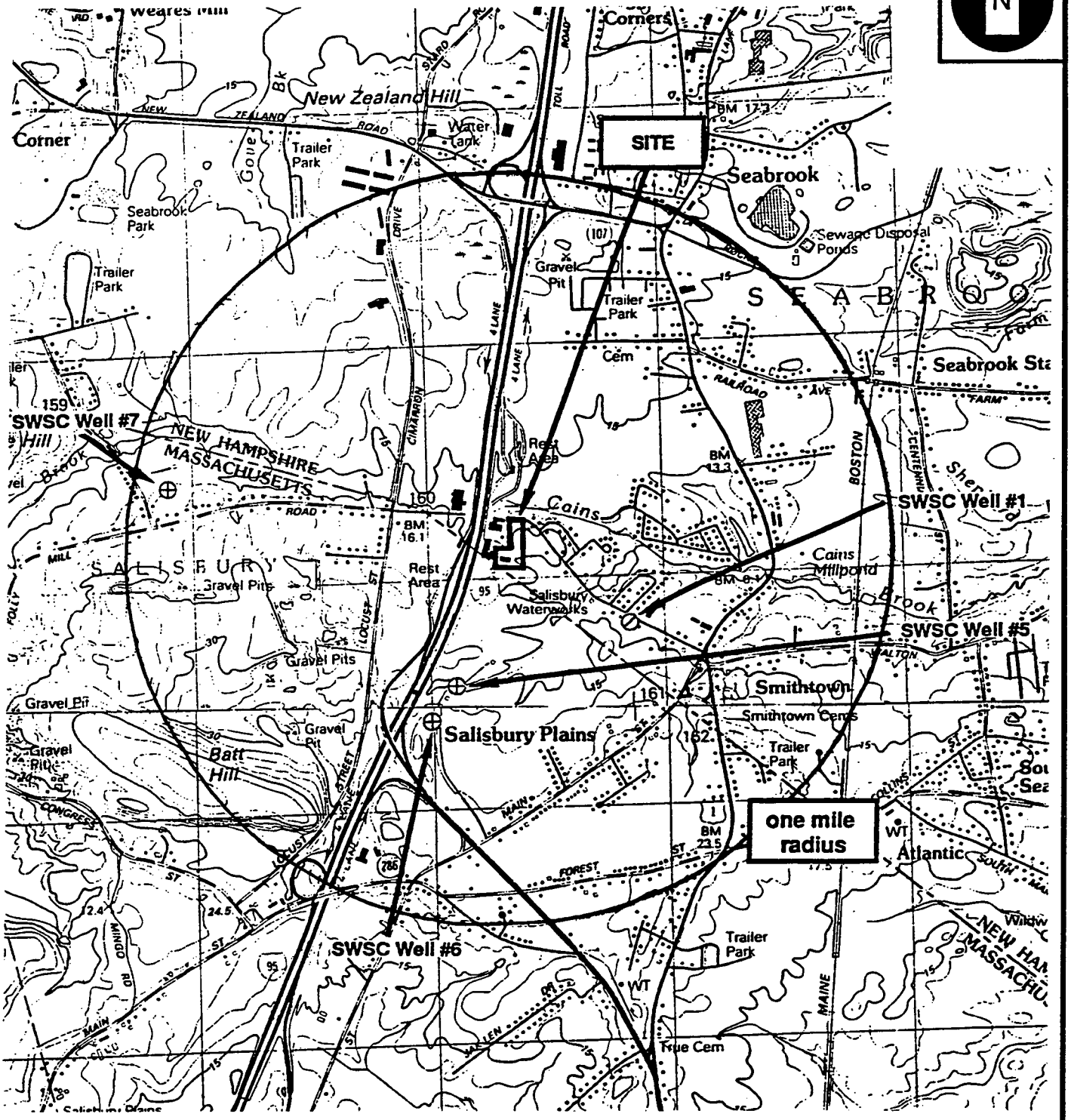
SITE DESCRIPTION

The Quinn, K. J. & Co. Inc. site (K. J. Quinn) is located at 135 Folly Mill Road in Seabrook, New Hampshire. The property is located in Rockingham County at latitude 42° 52' 51" and longitude 70° 52' 53". The Seabrook Tax Assessor's Map 9 identifies the site as lot 266 which is 6.74 acres in size. (See Figure 1 and Figure 2) [32, 41]

K. J. Quinn has manufactured both water- and solvent- based thermoplastic polyurethanes, polyurethane resins, and protective and decorative coatings at the site since 1967. Prior to 1967 the land was undeveloped [2]. K.J. Quinn is currently an operating specialty chemical manufacturer producing urethane coatings and adhesives [4].

The 1993 Seabrook zoning map shows the area where the site is located zoned for residential and light commercial [5]. The parcel owned by K.J. Quinn is used solely for industrial purposes. Nearby land uses include residential, commercial, and industrial. Salisbury, Massachusetts intersects the southern border of the site property. Interstate 95 lies approximately 500 feet west of the site. Cains Brook, which flows in an easterly direction, lies approximately 500 feet north of K. J. Quinn.

An Environmental FirstSearch Report indicates that there are thirty RCRA notifiers within a one-mile radius of the K.J. Quinn site. The Report indicates that there is one additional CERCLIS site and no N.L. sites within the one-mile radius. [16] Attachment B provides a listing of these sites and a spotting map for relative location with respect to the K.J. Quinn site.

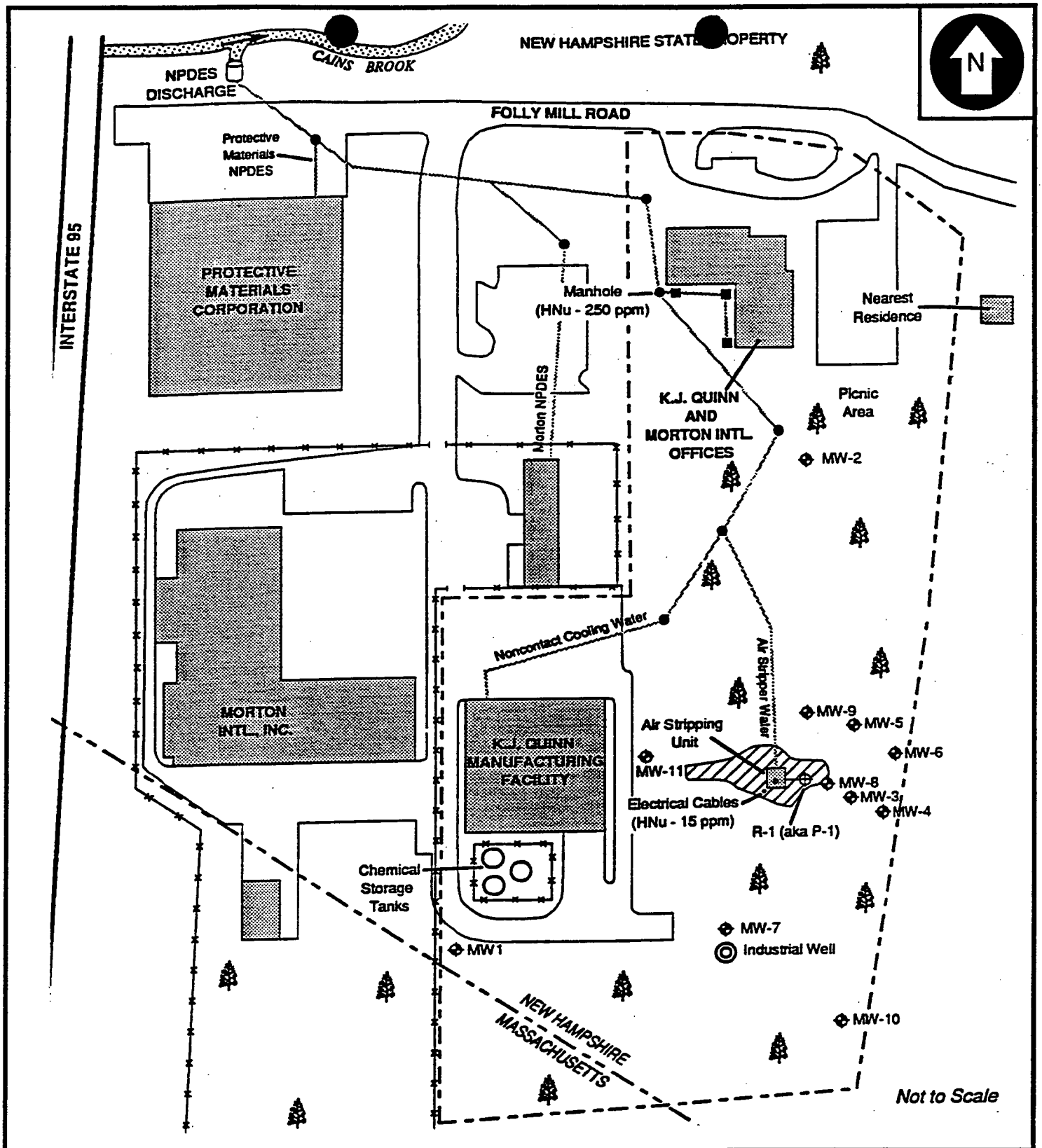


Base Map is a Portion of the following 7.5' x 15' U.S.G.S Quadrangle(s):
Exeter, NH; Newburyport, MA, 1985

Source: TRC Companies, Inc.

FIGURE 1
LOCATION MAP
Quinn, K.J. & Co., Inc.
Seabrook, New Hampshire

Stone & Webster
Environmental Technology & Services
Boston, Massachusetts



LEGEND:
- Woodland
- Underground Pipes
- Recovery Well
- Monitoring Well
- Building
- Former Disposal Pit
- State Border
- Property Boundary
- Flow Direction
- Fence
- Storm Drain
- Manhole

Source: TRC Companies, Inc.

FIGURE 2
SITE MAP
Quinn, K.J. & Co., Inc.
Seabrook, New Hampshire

Stone & Webster
Environmental Technology & Services
Boston, Massachusetts

The property on which the site is located has been owned by K.J. Quinn since 1967. Prior to that, it was undeveloped (Winterholer, 1991). When K.J. Quinn bought the property, the parcel included the land immediately west of the site, which is currently owned by Morton International. Initially, K.J. Quinn's operations were conducted in both manufacturing facilities. In July, 1988, Morton began leasing one of the facilities, and in June, 1991, they bought it (TRCC, 1991). (See Figure 2)

The only processes known to have been conducted onsite are the production of thermoplastic urethane resin in pellet and granular form and liquid phase urethane elastomers. The urethane resins are used to manufacture protective and decorative wood coatings and seamless floors, and the elastomers are used to manufacture adhesives for glass and food wraps (NHDES, 1983a; NHBSWM, 1980). Thermoplastic resins were apparently manufactured in the facility that was sold to Morton (Yeargeau, 1983) so K.J. Quinn currently manufactures only liquid phase urethane.

There are three reactors on site for polyurethane manufacturing. There is also an internal barrel distiller that K.J. Quinn uses to reprocess cleaning solvents on site [4].

The New Hampshire Bureau of Solid Waste Management (NHBSWM) performed a Preliminary Assessment (PA) of K. J. Quinn in 1980 [1]. A former K.J. Quinn employee reported to the NHBSWM that, in the fall and winter of 1978, K.J. Quinn personnel dumped more than 100 barrels of liquid and solid waste into a pit on the K.J. Quinn property. Upon inspection of the site, NHBSWM personnel found a 21,000-cubic foot pit containing buried 55-gallon drums. More than 20 drums of flammable solvents including methyl ethyl ketone and xylene, 11 drums of butyl acetate, and 20 drums of paint cans and solidified urethane waste were removed form the pit between June and August 1980. Many of the drums were dumped open-topped into the pit, therefore inspectors suspected that some of the waste had seeped into the ground [1, 2]. No records of sampling and analysis from the drums were identified.

In August, 1980, the drums were removed, clean fill was imported and groundwater monitoring wells were installed by Roy F. Weston, Inc. (Weston) under contract to K.J. Quinn.

The first record of results from groundwater sampling is from May 1982. New Hampshire Water Supply and Pollution Control Commission (NHWSPCC) personnel collected samples from monitoring wells 1 through 5. The NHWSPCC Organic Laboratory performed a headspace analysis using an Organic Vapor Analyzer. Two VOCs were detected at the indicated concentrations in samples from monitoring well three: 1,1,1-trichloroethane at 20 ug/l and toluene at 25 ug/l. NHWSPCC personnel returned and sampled the same monitoring wells one year later. In May 1983, the NHWSPCC analyzed the samples using a gas chromatograph/mass spectrometer in accordance with EPA Method 624. The NHWSPCC analysis detected VOCs in samples from monitoring wells three and four. 1,1-dichloroethane at 44 ug/l, 1,1,1-trichloroethane at >250 ug/l, tetrahydrofuran at 339 ug/l, and methyl ethyl ketone at 330 ug/l were detected in a sample from monitoring well three. 1,1-dichloroethane at 78 ug/l, 1,1,1-trichloroethane at >800 ug/l, ethylbenzene at 11 ug/l, toluene at 20 ug/l, m-xylene at 12 ug/l, o&p xylene at 25 ug/l, tetrahydrofuran at 906 ug/l,

methyl ethyl ketone at 870 ug/l, and acetone at 39 ug/l were detected in a sample from monitoring well four [2].

In 1983, K.J. Quinn reported that the chemicals used at the site in the production of resins and in cleaning machinery included:

> *xylenes, 1,1,1-trichloroethane, methyl ethyl ketone (MEK), isopropanol, toluene, m-pyrol, ethyl alcohol, methyl cellusolve, cellusolve acetate, methylene chloride, butyl acetate, dimethyl formamide, and tetrahydrofuran (THF).*

In 1983, K.J. Quinn reported the offsite disposal of approximately 30 drums of hazardous waste per month through All County Environmental, a licensed hazardous waste transporter. Typical wastes generated include mixed flammable solvents (butyl acetate, MEK, xylol, toluol, cellusolve acetate, and dimethyl formamide) and waste urethane residue in solid form. Subsequent to 1983, K.J. Quinn used Browning-Ferris Industries to dispose of their hazardous wastes. Currently, K.J. Quinn disposes of their hazardous waste through Ashland Chemical once every three months [8].

In September, 1983, Weston, Inc. installed a groundwater remediation system at K.J. Quinn, consisting of a recovery well and an air stripper. Groundwater at K. J. Quinn was sampled and analyzed for volatile organic compounds (VOCs) between 1983 and 1993. NHDES required sampling and analysis of the air stripper influent and effluent and for the monitoring wells for VOCs by EPA Method 624. The SSI Final Report indicated that over the years, there were different schedules for environmental monitoring at the site. Over the 8 year period prior to the SSI, site groundwater was sampled and analyzed for VOCs at least several times per year. Starting in the autumn of 1983, Resource Analysts Inc. (RAI) provided the laboratory analytical services; Analytics Environmental Laboratory Inc. provided more recent laboratory analytical services. Both laboratories analyzed samples of K. J. Quinn groundwater for VOCs by EPA Method 624 [2, 12, 13, 14]. The following compounds at the indicated concentrations were found in samples of site groundwater: acetone at 300 ug/l, chloroethane at 290 ug/l, chloroform at 42 ug/l, 1,1-dichloroethane at 1300 ug/l, 1,2-dichloroethane at 58 ug/l, 1,1-dichloroethylene at 50) ug/l ethylbenzene at 56 ug/l, methyl ethyl ketone at 870 ug/l, methyl isobutyl ketone at 11 ug/l, methylene chloride at 35 ug/l, tetrachloroethylene at 11 ug/l, tetrahydrofuran at 11,500 ug/l, 1,1,1-trichloroethane at 1100 ug/l, trichlorethylene at 50 ug/l, toluene at 36 ug/l, m-xylene at 72 ug/l, o&p-xylene at 48 ug/l and methyl tertiary butyl ether at <5 ug/l [2,12,13,14].

The Salisbury Water Supply Company (SWSC) Well #1 is located approximately 1200 feet east of the site. In 1983, SWSC Well #1 was found to be contaminated by three synthetic organic chemicals at the following concentrations: trichloroethylene at 1.9 μg/l, 1,1,1-trichloroethane at 6.8 μg/l and tetrahydrofuran at an undetermined concentration. Well # 1 was closed in 1983 due to the contamination.

Off-site monitoring wells were installed by K.J. Quinn between the former disposal pit area and SWSC Well #1. Monitoring well #17, located between SWSC Well #1 and the site, was installed in December, 1983. In February, 1984, the well was sampled and analysis was performed by EPA Method 624. The following compounds at the indicated concentrations were detected in monitoring

well #17: chloroethane (trace), 1,1-dichloroethane at 90 ug/l, 1,1-dichloroethylene at 15 ug/l, ethylbenzene (trace), methylene chloride (trace) tetrahydrofuran at 16,000 ug/l, toluene (trace) and 1,1,1-trichloroethane at 570 ug/l [3]. In June, 1985, the following compounds at the indicated concentrations were detected in monitoring well # 17: 1,1-dichloroethylene at 50 ug/l, 1,1-dichloroethane at 90 ug/l, 1,1,1-trichloroethane at 730 ug/l, and tetrahydrofuran at 1900 ug/l. Samples analysis results reported in December, 1986 show that the following contaminants at the indicated concentrations were detected in a sample taken from monitoring well #17: 1,1,-dichloroethylene at 7 ug/l, 1,1-dichloroethane at 5 ug/l, 1,1,1-trichloroethane at 72 ug/l, and tetrahydrofuran at 160 ug/l. Sample analysis results reported in November, 1987, show that only 1,1,1-trichloroethane was detected in a sample taken from monitoring well # 17 [2]. Over time, the concentrations of the contaminants have declined in samples taken from the off site monitoring wells located between K. J. Quinn and SWSC Well #1 [2,3].

In 1989, the Massachusetts Department of Environmental Quality Engineering performed a PA of the Salisbury Water Supply Company's Wells # 1, 5, and 6 (which are all within 1200 feet of the site). SWSC Well #1 was closed in 1983 due to contamination attributed to K.J. Quinn [3]. Figure 1 shows the location of the site and the Salisbury Water Supply Company (SWSC) wells.

The groundwater treatment system designed and installed by Weston, Inc. operated from 1983 until 1991 [2, 17]. NHDES allowed K.J. Quinn to stop groundwater treatment by air stripping on July 11, 1991. NHDES required that K.J. Quinn restart the treatment unit after a hiatus of 3 months to sample the influent and effluent for VOCs by EPA Method 624 [17].

TRCC conducted a Screening Site Inspection (SSI) for the Environmental Protection Agency Region I in 1991. The SSI recommended further remedial activities "based on concentrations of hazardous compounds recently detected in the groundwater at levels exceeding current MCLs, and based on the number of potential receptors" [2].

On November 1, 1991, following the instructions of NHDES, K.J. Quinn had its contractors perform sampling and analysis at the site. In addition to the sampling the air stripper influent, monitoring wells 2, 4, 5, 6, 7, and 10 were sampled. Monitoring wells 1, 3, 8 could not be sampled due to obstructions or lack of water. The monitoring wells tested free of VOC contamination except for trace levels of toluene (< 5 μg/l) in monitoring wells 4, 5, 6 and 10. The following VOCs and concentrations (in μg/l) were detected in samples taken from the recovery well : chloroethane (26), 1-1-dichloroethane (6), ethylbenzene (15), m-xylene (7), o&p-xylene (20), and methyl tertiary butyl ether (MTBE) (<5) [12].

On January 31, 1992, the NHDES informed K.J. Quinn that "based on the analytical data provided, groundwater treatment will no longer be required. The groundwater treatment system may be dismantled." NHDES required that K.J. Quinn sample the recovery well in February 1992 and February 1993 [19].

K.J. Quinn prepared a 9-page letter, dated June 3, 1992, in response to the SSI Final Report. K.J. Quinn stated in this letter to Don Smith of EPA Region I that K.J. Quinn had never used trichloroethylene. In addition, K.J. Quinn stated that "Of particular interest is Tower Press, formerly

the House of White Birches, a printing company that would have used inks and solvents which is located adjacent to Salisbury's Well # 1" [15].

On April 13, 1993, the NHDES informed K.J. Quinn that "all sources of groundwater contamination at the subject site discovered during the site investigation have been eliminated and ambient groundwater standards are being met throughout the site." The NHDES further said that "DES will not require additional investigation, remedial measures, or groundwater monitoring at this time" [18].

During construction at the site in August of 1993, an excavator encountered a 2000-pound chunk of solidified urethane resin. On September 15, 1993, Weston Inc. excavated five test pits on site, collected bottom and side wall soil samples from the pit from which the urethane resin was removed, and analyzed the samples for VOCs in accordance with EPA Method 8020. One estimated detection of carbon disulfide was reported in one sample at below the reporting limit. Weston concluded, "It appears that the soils in the vicinity of the occurrence of the urethane resin have not been impacted" [20].

K.J. Quinn's 1993 Hazardous Waste Report for the EPA listed four types of waste produced at the site:

- sludge from solvent distillation
- ignitable spent solvent and urethane from reactor cleaning
- ignitable solids from product filtering and end runs
- solids urethane polymer with entrapped solvent from spill cleanup

The waste codes listed for these materials were D001, D035, and F003 [10]. *The Code of Federal Regulations* defines D001 as the code for ignitable wastes, D035 as the code for methyl ethyl ketone, and F003 as the code for nonhalogenated solvents [11]. In 1994, K.J. Quinn shipped 22,269 pounds of manifested hazardous wastes from the site [8].

Bryant Winterholer, the Director of Safety and Environmental Affairs for K.J. Quinn, told Stone & Webster (S&W) that there has been a ban on the use of chlorinated hydrocarbons at the site for 5 years. In addition, he stated that K.J. Quinn no longer uses ethyl acetate as a solvent [9].

The sources identified at the K.J. Quinn site include the 51 buried drums found in the 21,000 cubic foot disposal pit between June and August, 1980; the effluent from the groundwater treatment unit which operated at the site from September, 1983 to August, 1991; and the 2,000 lb piece of solidified urethane resin unearthed in 1993. Table 1 summarizes the types of potentially hazardous substances disposed, used or stored on the K.J. Quinn site.

Table 1
Hazardous Waste Quantity For
K.J. Quinn, Seabrook, NH

Substance	Quantity or Volume/Area	Years of Disposal	Source Area
Flammable solvents, including methyl ethyl ketone and xylene	> 20 Drums	Unknown	21,000 cubic foot disposal pit
Butyl acetate	11 Drums	Unknown	"
Paint, solidified urethane wastes	20 Drums	Unknown	"
Liquid effluent from groundwater treatment system	10,000 gallons/day maximum allowed by permit	Sept., 1983 to Aug., 1991	Discharged to Cains Brook
Solidified urethane resin	2000 lb 2 275-gallon tanks 1 75-100-gallon tank	Unknown	Unearthed on site near disposal pit

References: [1, 2, 17, 20]

Table 2 presents the identified structures on the K.J. Quinn property that are potential sources of contamination, the containment factors associated with each source, and the relative location of the sources.

Table 2
Source Evaluation For
K.J. Quinn, Seabrook, NH

Potential Source Area	Containment Factors	Spatial Location
Disposal pit	None	Located east of the K.J. Quinn manufacturing facility (See Figure 2)
Liquid effluent discharge/outfall into Cains Brook	None	Located approximately 500 feet north of the site
Urethane block burial area	None	Located approximately 500 feet from the disposal pit, east of the K.J. Quinn manufacturing facility

Reference: [1, 2, 17, 20]

GROUNDWATER PATHWAY

Site Geology

A USDA Soil Conservation Service Soil Survey Map of Rockingham County, New Hampshire depicts the soil in the area of the site as Hinckley loamy sand with 0 to 3 percent slopes. The natural drainage is described as excessive. There is 1 to 1.5 feet of poorly graded silty gravels and gravel, sand, silt mixtures over stratified sand and gravel [21].

The overburden in the area of the site generally consists of fine to coarse brown or gray sand and gravel, overlain by a thin layer of peat. The depth to bedrock is over 50 feet in the general area of the site [3]. Bedrock consists of gray, medium-grained porphyritic granite with microline phenocrysts of the Newburyport Complex. This complex intrudes the Kittery Formation [22, 23].

The soil borings performed on site ranged in depth from 20 to 45 feet before refusal was encountered. The boring logs describe the site as underlain by stratified granular deposits. The depth to ground water is approximately 10 to 20 feet in the area of the site [24]. The general direction of groundwater flow in Seabrook is to the east [25, 27].

All of Seabrook, and most of Salisbury, Massachusetts and Hampton Falls, New Hampshire are located within 4 miles of the site. In addition, small portions of Amesbury, Massachusetts and South Hampton, Kensington, and Hampton, New Hampshire are located within the site's 4-mile radius. The municipal wells for Salisbury and Seabrook are located within the 4-mile radius of K. J. Quinn.

Groundwater Usage

The Salisbury Water Supply Co. (SWSC) services most of Salisbury's 6,000 year-round residents. In the summer, SWSC estimates the number of customers to exceed 25,000 [26]. All three of SWSC's functional wells are located within 1 mile of the site (See Figure 1). SWSC Well #1, located approximately 1200 feet east of the K.J. Quinn site, was closed in 1983 due to chemical contamination suspected to have leached from the site [3]. However, the Water Quality Supervisor for the SWSC stated that this well was closed due to high iron and manganese concentrations [26]. No current data concerning Well #1 was available from SWSC. The locations of the private wells in Salisbury are unknown.

The town of Seabrook provides water to approximately 8,500 year-round residents from six overburden and four bedrock wells located within 3 miles of the site. All of Seabrook's municipal wells are located to the west of Interstate Route 95. The municipal wells located within 4 miles of the site, the well types, the locations, and the populations served are listed in Table 3 below.

Table 3
Public Groundwater Supply Sources Within Four Miles of K.J. Quinn, Seabrook, NH

Distance/Direction from Site	Source Name	Location of Source	Estimated Population Served*	Source Type
0.4 mi/south	Well #5	Salisbury	2,000	Overburden
0.5 mi/south	Well #6		2,000	Overburden
0.9 mi/west	Well #7		2,000	Overburden
	PWID#			
1.0 mi/west	2111010-003	Seabrook	850	Overburden
1.0 mi/west	2111010-004		850	
1.6 mi/north	2111010-005		850	
1.6 mi/north	2111010-0010		850	
1.8 mi/northwest	2111010-001		850	
1.8 mi/northwest	2111010-002		850	
2.4 mi/northwest	2111010-006		850	Bedrock
2.4 mi/northwest	2111010-007		850	
2.4 mi/northwest	2111010-008		850	
2.5 mi/northwest	2111010-009		850	

Note: *Well water is blended so that each well contributes to the whole population. The wells run at the same time. No single well contributes more than 40%.

References: [26, 27, 38]

There are also populations in New Hampshire that are served by public wells that are not municipal wells, as defined by the New Hampshire Department of Environmental Services (NHDES). A listing of the public and municipal wells in New Hampshire is included in Attachment A. This listing was provided by the NHDES GIS Program, and provides the name and Public Water Supply ID number for the system, town location, the population served, the distance from the site, and the well type for each public system within the four mile radius of the site. The public water systems report in conjunction with conversations with the Seabrook, New Hampshire and Salisbury, Massachusetts Water Departments were used to determine the total public water supply populations in the distance rings for the K. J. Quinn site. The populations are presented in Table 4 below. Private well drinking water populations were determined through phone conversations with Water Department personnel, and by utilizing data obtained from the Frost Associates report for the K. J. Quinn site. According to the Seabrook Water Superintendent, five private wells are known to be in use throughout the town. All of these private wells are located more than one mile from the K. J. Quinn site [27]. SMWD personnel located the private Seabrook wells on a map for S&W [5]. However, Frost data indicates the presence of private groundwater wells in the 0 to 1 mile radius around the site. Frost relies on census data and indicates the presence of private wells which may or may not be used for drinking water purposes. For conservatism, the Frost data is presented in Table 4 below. [35, 36].

Table 4
Estimated Drinking Water Populations Served by Groundwater Sources within 4 Miles of K. J. Quinn & Co., Inc., Seabrook, NH

Radial Distance from K.J. Quinn (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
0.00 < 0.25	10	0	10
0.25 < 0.50	12	2000	2012
0.50 < 1.0	31	4000	4031
1.0 < 2.0	314	5215	5529
2.0 < 3.0	696	4101	4797
3.0 < 4.0	617	569	1186
TOTALS	1680	15885	17,565

References: [26, 27, 35, 36, 38]

Previous Groundwater Sampling

At the time of the startup of the groundwater remediation unit in 1983, K.J. Quinn began routine monitoring of onsite and offsite ground water wells. In addition to sampling site monitoring wells and the recovery well, K.J. Quinn's consultant, Weston, Inc. also sampled SWSC Well #1.

From September 1983 to July 1991, K.J. Quinn conducted a groundwater treatment program in the area to the east of the manufacturing building as shown on Figure 2. Remedial action consisted of groundwater recovery, treatment and discharge performed under NHDES guidance. The groundwater treatment consisted of pumping the groundwater through a twelve inch diameter recovery well and removing the volatile organics by means of a thirty foot air stripping tower. NHDES required that K.J. Quinn sample the influent, the effluent and the monitoring wells, and to analyze the samples for volatile organic compounds (VOCs) in accordance with EPA Method 624.

Groundwater at K. J. Quinn was sampled and analyzed extensively for volatile organic compounds (VOCs) between 1983 and 1991. The SSI Final Report indicated that over the years there were different schedules for environmental monitoring at the site. File documents indicated that site groundwater was sampled and analyzed for VOCs at least several times a year over an eight year period. Starting in the autumn of 1983, Resource Analysts Inc. provided the sampling and laboratory analytical services; Analytics Environmental Laboratory Inc. provided more recent services. Both laboratories analyzed samples of K. J. Quinn groundwater for VOCs by EPA Method 624 [2, 12, 13, 14]. The groundwater treatment system designed and installed by Weston operated from 1983 until 1991. NHDES allowed K.J. Quinn to stop groundwater treatment by air stripping in July, 1991, but required K.J. Quinn to restart treatment after a three months and to sample influent and effluent for VOC's in accordance with EPA Method 624 [17].

Analytical Results

Sampling and analysis results of the SWSC well #1 indicated that the well was contaminated by the following three compounds at concentrations in μg/l: trichloroethylene (1.9), 1,1,1 trichloroethane (6.8), and tetrahydrofuran (undetermined). SWSC well #1 was closed subsequent to the discovery of the contamination in 1983 [3].

Over the years, the following compounds were found in samples of site groundwater with maximum concentrations in μg/l: acetone (300), chloroethane (290), chloroform (42), 1,1-dichloroethane (1300), 1,2-dichloroethane (58), 1,1-dichloroethylene (50), ethylbenzene (56), methyl ethyl ketone (870), methyl isobutyl ketone (11), methylene chloride (35), tetrachloroethylene (11), tetrahydrofuran (11,500), 1,1,1-trichloroethane (1100), trichlorethylene (50), toluene (36), m-xylene (72), o&p-xylene (48) and methyl tertiary butyl ether (<5) [2,12,13,14].

Table 5 shows the compounds detected in the K.J. Quinn Recovery Well in November, 1991, and February, 1992 and 1993. As mentioned above, the 1991 sampling was performed after restarting the pump and treat system following a three month hiatus. K.J. Quinn did not start the pump and treat system before sampling in 1992 and 1993. Analytics Environmental Laboratories, Inc. conducted the chemical analysis according to 40 CFR Part 136, EPA Method 624.

Table 5
Sample Analytical Results Summary
Recovery Well Samples - K.J. Quinn

Sample Date	2/10/93	2/18/92	11/1/91	MCL
concentration units	µg/l	µg/l	µg/l	µg/l
chloroethane (ethyl chloride)	26	163	290	NL
1-1- dichloroethane	6	122	120	NL
1,1,1-trichloroethane	ND	9	<5	200
toluene	ND	27	6	1000
ethylbenzene	15	56	32	700
m-xylene	7	72	13	10,000
o&p-xylene	20	23	48	10,000
MTBE	<5	ND	ND	NL

ND = not detected
NL = not listed
The detection limits given in the reports for the above listed compounds are 5 µg/l.
References: [12, 13, 14, 37]

SURFACE WATER PATHWAY

Surface water from the eastern area of the site is expected flow to the east since the land slopes gently in that direction. Based on observations made during the 1995 site reconnaissance, it appears that surface water on the paved area to the north and west of the manufacturing building drains into Cains Brook through the stormwater grates on site. The paved area to the east and south of the manufacturing building is enclosed by a berm which has a valved drain on the east side for storm water [4].

K.J. Quinn holds NPDES Permit No. NH0001091 to discharge 79,000 gallons per day of noncontact cooling water and boiler blowdown and 10,000 gallons per day of treated groundwater through an outfall to Cains Brook (See Figure 2) [28]. Groundwater treatment unit operation ceased in 1991. K.J. Quinn's 1995 NPDES permit application lists 79,000 gallons per day of noncontact cooling water as the only operation contributing flow to the discharge [29].

Cains Brook flows easterly for approximately two miles, then merges with Shepherd Brook to form Mill Creek. Mill Creek flows for approximately one and one-half miles before emptying into Hampton Harbor. Hampton Harbor extends for approximately one and one-half miles before discharging into the Atlantic Ocean. The Atlantic Ocean makes up the remainder of the 15-mile downstream surface water pathway. [32]

Cains Brook is assumed to be a small to minimal stream with a flow rate of < 10 cfs. Mill Creek is also assumed to be a small stream with a flow rate of < 10 cfs. Hampton Harbor is a tidal water body, and the Atlantic Ocean is an ocean zone. There are no known drinking water intakes along the downstream surface water pathway. [4, 27]

Cains Brook is designated by the U.S. Fish and Wildlife Services as a palustrine forested wetland until immediately before its confluence with Shepherd Brook. At this point, to the mouth of the Hampton Harbor inlet, the wetlands associated with the site's surface water pathway are designated as estuarine intertidal system. There are 5.8 miles of wetlands frontage along the 15-mile downstream surface water pathway. These are distributed as follows: Cains Brook, 2 miles; Mill Creek, 2 miles; Hampton Harbor, 1.8 miles; Atlantic Ocean, 0 miles. [32]

All surface water bodies in the 15-mile downstream surface water pathway are assumed to support fisheries. Specifically, the coastal and estuarine area downstream of K.J. Quinn supports recreational fishing for mackerel, bluefish, cod, pollock, haddock and cusk. These habitats also support soft shell clams, oyster, and mussels. Most of the New Hampshire lobster fishing is located in the near shore coastal waters with ocean depths of less than 100 feet. [34]

Table 6 summarizes the characteristics of the water bodies in the 15-mile downstream surface water pathway.

Table 6
Water Bodies Within the Surface Water Segment of
K.J. Quinn, Seabrook, New Hampshire

Surface Water Body	Descriptor[a]	Length of Reach	Flow Characteristics (cfs)[b]	Length of Wetlands
Cains Brook	Minimal stream	2 miles	< 10	2 miles
Mill Creek	Small to moderate stream	1 miles	< 100	2 miles
Hampton Harbor	Coastal tidal	1.5 miles	NA	1.8 miles
Atlantic Ocean	Shallow ocean zone	10.5 miles	NA	0 miles

[a] Minimal stream. Small to moderate steam. Moderate to large stream. Large stream to river. Very large river. Coastal tidal waters. Shallow ocean zone or Great Lake. Deep ocean zone or Great Lake. Three-mile mixing zone in quiet flowing river.

[b] Cubic feet per second.

References: [32]

There are s*ix species or communities listed by the New Hampshire Natural Heritage Inventory as endangered, threatened or potentially threatened* which may reside *along the site's 15-mile surface water pathway.* Four state threatened species, which are protected under the New Hampshire Native Plant Protection Act and potentially residing in the 15-mile downstream pathway, are the salt-marsh gerardia, small spike-rush, beech grass, and the sand drop-seed. The federal candidate species, which is imperiled throughout its habitat range and potentially residing in the 15-mile downstream pathway, is the Eaton's quill wort. The state and federally endangered species potentially residing in the 15-mile downstream pathway is the piping plover. [2, 39]

Additionally, the following species which are state or federally listed as endangered or threatened are found in the coastal region: bald eagles, peregrines, common loon, marsh hawks, osprey, arctic and roseate tern, least tern, and the short nose sturgeon [34].

The entire K. J. Quinn site lies within FEMA Flood Hazard Zone C, where the land is subjected to only minimal degrees of flooding [33]. The annual precipitation in Concord, New Hampshire, which is approximately 40 miles northwest of Seabrook, is 36.53". [40]

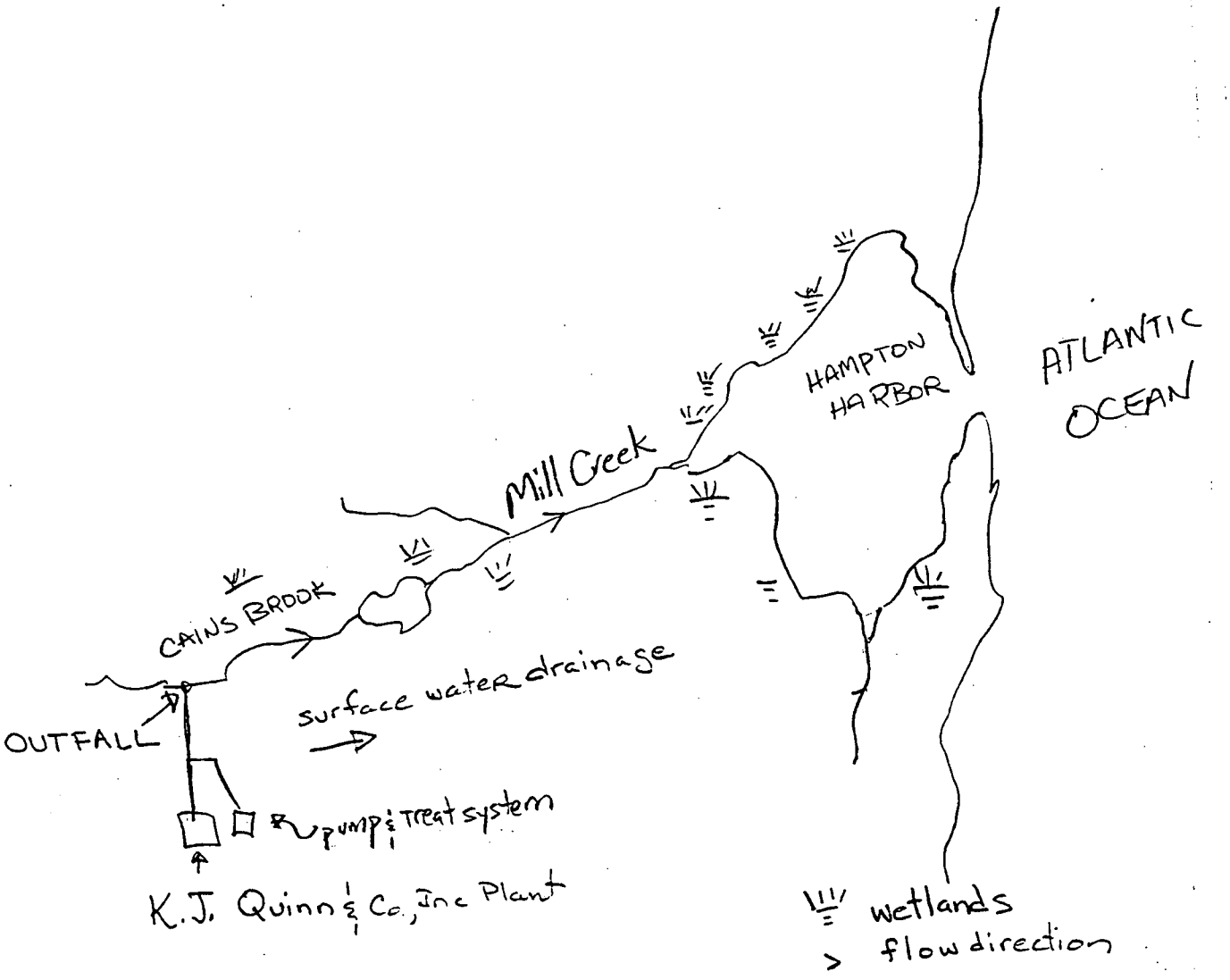
Previous Surface Water Sampling

During the years that K.J. Quinn operated the remediation unit, the effluent was discharged through K.J. Quinn's shared outfall into Cains Brook. In 1983 as part of the NPDES permitting process, K.J. Quinn had the air stripper influent tested for acid compounds, base neutral compounds and pesticides. None of these compounds were detected in the influent [30].

The first sampling of groundwater collected from the recovery well occurred on September 23, 1983. A trip blank sample and multiple samples of influent and effluent were collected by Weston personnel. Samples were analyzed on September 23, 1983 by Resource Analysts for VOCs using ASTM Method 3781-79. Four VOCs were detected at concentrations as high as 5600 ppb (Weston, 1983). After the initial analysis, samples of influent and effluent were collected weekly until November 21, 1982, after which samples were collected monthly until May 4, 1984 (Resource Analysts, 1984). No sampling from January to March 1984 is available. Influent samples were analyzed by ASTM Method 3781-79 and effluent samples were analyzed by EPA Method 624 (Resource Analysts, 1984). During this period, thirteen VOCs were detected at concentrations up to 12,000 μg/L in the influent (Resource Analysts, 1984). Concentrations in the effluent were considerably lower.

According to the 1991 SSI Final Report, samples from the remediation unit influent and the effluent were collected weekly or monthly during the 1980s. The Resource Analysts Inc. reports contained in the 1991 SSI Final Report indicate the presence of VOCs in the treatment unit effluent which was discharged to Cains Brook. The Resource Analysts lab reports indicate that the following compounds were in the effluent: methyl ethyl ketone, tetrahydrofuran, and 1,1,1-trichloroethane.

The NPDES compliance inspections for 1993 and 1994 noted no violations [31]. The only surface water that discharges into Cains Brook on the site is from storm drains located next to the administration building. The S&W site reconnaissance team inserted a photoionization detector (PID) into the stormwater grate where a high reading had previously been detected during the SSI site visit. No readings above background were registered by this instrument on the May 8, 1995 SIP site reconnaissance. [4]



NOTE: NOT DRAWN TO SCALE

Approximate Distances:

Cains Brook to Mill Creek	2 miles
Mill Creek to Hampton Harbor	1 mile
Hampton Harbor to the Atlantic Ocean	3 miles

FIGURE 3
SURFACE WATER MIGRATION ROUTE SKETCH
Quinn, K.J. & Co., Inc.
Seabrook, New Hampshire

Stone & Webster
Environmental Technology & Services
Boston, Massachusetts

There are 35 workers on site for one daily shift at K.J. Quinn [8]. According to the CENTRACTS report, there is a population of approximately 1,383 within a one mile radius of the site [35, 36]. Since the site is in the vicinity of a coastal resort area, the population varies greatly with the summer season.

There are no barriers to pedestrian or vehicular access to the K.J. Quinn property. There is a small picnic area (four tables) located south of the office building's parking lot (See Figure 2). [2] The nearest residence is located approximately 200 feet east of the site property [2, 8].

No residences, schools, or day care facilities lie within 200 feet of areas of prior contamination. No odors, leachate or soil discoloration were detected during the site reconnaissance on May 8, 1995.

There are no known terrestrial sensitive environments located on the site. The New Hampshire Non-game and Endangered Wildlife Program's list of threatened and endangered species potentially residing in New Hampshire indicates that several threatened or endangered species may inhabit areas within the four-mile radius around the K.J. Quinn site. No specific information was available on the exact locations or occurrences of these species. A complete list of species and typical habitat areas is included as Attachment C [42].

Previous Soil Sampling

The soil within the drum burial pit was removed in 1980 and replaced with clean fill [1, 2]. A soil gas survey performed by GZA in 1988 did not detect the presence of any VOCs [2].

A 2000 lb block of urethane resin was found on site during the construction of a loading dock on the east side of the Quinn manufacturing facility in August 1993. K.J. Quinn had the block removed and shipped off site in five drums. In September 1993, Weston Inc. excavated five test pits to a depth of 4 feet, collected bottom and side wall soil samples from one of the pits, then analyzed the samples for purgeable aromatic compounds by EPA Method 8020. One estimated detection of carbon disulfide was reported in one sample at a level below the reporting limit. Weston Inc. concluded, "It appears that the soils in the vicinity of the occurrence of the urethane resin have not been impacted" [20].

No other known soil sampling has been performed at the K.J. Quinn site.

AIR PATHWAY

According to the CENTRACTS report, there is a resident population of 28,325 residing within four miles of the K.J. Quinn site. Table 7 presents the resident population characteristics in concentric rings around the site. This population does not include student or workers present in the four-mile radius of the site.

Table 7
Estimated Population
Within Four Miles of
K.J. Quinn, Seabrook, NH

Radial Distance from K.J. Quinn site (miles)	Estimated NH Resident Population	Estimated MA Resident Population	Total Estimated Population
0.00 < 0.25	264	21	285
0.25 < 0.50	309	58	367
0.50 < 1.00	1184	200	1384
1.00 < 2.00	2981	1770	4751
2.00 < 3.00	2034	6191	8225
3.00 < 4.00	2982	10331	13313
TOTAL	9754	18571	28325

References: [35, 36]

Wetlands are present in the four-mile radius around the K.J. Quinn site. The characteristics of the nearby population and surrounding area, including sensitive environments and threatened and endangered species, are more fully discussed in the Soil Exposure section of this report.

Previous Air Sampling

There have been no reported releases of hazardous substances to the air at the K.J. Quinn site. No readings above background were detected by personal air monitoring conducted during the S&W site reconnaissance on May 8, 1995. No other known air monitoring has been performed at the K.J. Quinn site.

SUMMARY AND CONCLUSIONS

The Quinn, K. J. & Co. Inc. site (K. J. Quinn) is located at 135 Folly Mill Road in Seabrook, New Hampshire. K.J. Quinn has manufactured both water- and solvent- based thermoplastic polyurethanes, polyurethane resins, and protective and decorative coatings at the site since 1967. Prior to 1967 the land was undeveloped [2]. K.J. Quinn is currently an operating specialty chemical manufacturer producing urethane coatings and adhesives [4].

The area where the site is located zoned for residential and light commercial [5]. The parcel owned by K.J. Quinn is used solely for industrial purposes. Nearby land uses include residential, commercial, and industrial. Salisbury, Massachusetts intersects the southern border of the site property. Interstate 95 lies approximately 500 feet west of the site. Cains brook, which flows in an easterly direction, lies approximately 500 feet north of K. J. Quinn.

An Environmental FirstSearch Report indicates that there are thirty RCRA notifiers within a one-mile radius of the K.J. Quinn site. The Report indicates that there is one additional CERCLIS site and no NPL sites within the one-mile radius. [16]

The only processes known to have been conducted onsite are the producation of thermoplastic urethane resing in pellet and granular form and liquid phase urethane elastomers. The urethane resins are used to manufacture protective and decorative wood coatings and seamless floors, and the elastomers are used to manufacture adhesives for glass and food wraps (NHDES, 1983a; NHBSWM, 1980). Thermoplastic resins were apparently manufactured in the facility that was sold to Morton (Yeargeau, 1983) so K.J. Quinn cuirrently manufactures only liquid phase urethane.

There are three reactors on site for polyurethane manufacturing. There is also an internal barrel distiller that K.J. Quinn uses to reprocess cleaning solvents on site [4].

The New Hampshire Bureau of Solid Waste Management (NHBSWM) performed a Preliminary Assessment (PA) of K. J. Quinn in 1980 [1]. A former K.J. Quinn employee reported to the NHBSWM that, in the fall and winter of 1978, K.J. Quinn personnel dumped more than 100 barrels of liquid and solid waste into a pit on the K.J. Quinn property. Upon inspection of the site, NHBSWM personnel found a 21,000-cubic foot pit containing buried 55-gallon drums. More than 20 drums of flammable solvents including methyl ethyl ketone and xylene, 11 drums of butyl acetate, and 20 drums of paint cans and solidified urethane waste were removed form the pit between June and August 1980. Many of the drums were dumped open-topped into the pit, therefore inspectors suspected that some of the waste had seeped into the ground [1, 2]. No records of sampling and analysis from the drums were identified.

In August, 1980, the drums were removed, clean fill was imported and groundwater monitoring wells were installed by Roy F. Weston, Inc. (Weston) under contract to K.J. Quinn.

The first record of results from groundwater sampling is from May 1982. New Hampshire Water Supply and Pollution Control Commission (NHWSPCC) personnel collected samples from onsite monitoring wells NHWSPCC personnel returned and sampled the same monitoring wells one year

later. VOCs were detected in the samples collected.

In September, 1983, Weston, Inc. installed a groundwater remediation system at K.J. Quinn, consisting of a recovery well and an air stripper. Groundwater at K. J. Quinn was sampled and analyzed for volatile organic compounds (VOCs) between 1983 and 1993. NHDES required sampling and analysis of the air stripper influent and effluent and for the monitoring wells for VOCs by EPA Method 624. The following compounds at the indicated concentrations were found in samples of site groundwater: acetone at 300 ug/l, chloroethane at 290 ug/l, chloroform at 42 ug/l, 1,1-dichloroethane at 1300 ug/l, 1,2-dichloroethane at 58 ug/l, 1,1-dichloroethylene at 50) ug/l ethylbenzene at 56 ug/l, methyl ethyl ketone at 870 ug/l, methyl isobutyl ketone at 11 ug/l, methylene chloride at 35 ug/l, tetrachloroethylene at 11 ug/l, tetrahydrofuran at 11,500 ug/l, 1,1,1-trichloroethane at 1100 ug/l, trichlorethylene at 50 ug/l, toluene at 36 ug/l, m-xylene at 72 ug/l, o&p-xylene at 48 ug/l and methyl tertiary butyl ether at <5 ug/l [2,12,13,14].

The Salisbury Water Supply Company (SWSC) Well #1 is located approximately 1200 feet east of the site. In 1983, SWSC Well #1 was found to be contaminated by three synthetic organic chemicals at the following concentrations: trichloroethylene at 1.9 μg/l, 1,1,1-trichloroethane at 6.8 μg/l and tetrahydrofuran at an undetermined concentration. Well # 1 was closed in 1983 due to the contamination.

Off-site monitoring wells were installed by K.J. Quinn between the former disposal pit area and SWSC Well #1. Over time, the concentrations of the contaminants declined in samples taken from the off site monitoring wells located between K. J. Quinn and SWSC Well #1 [2,3].

The groundwater treatment system designed and installed by Weston, Inc. operated from 1983 until 1991 [2, 17]. NHDES allowed K.J. Quinn to stop groundwater treatment by air stripping on July 11, 1991. NHDES required that K.J. Quinn restart the treatment unit after a hiatus of 3 months to sample the influent and effluent for VOCs by EPA Method 624 [17].

TRCC conducted a Screening Site Inspection (SSI) for the Environmental Protection Agency Region I in 1991. The SSI recommended further remedial activities "based on concentrations of hazardous compounds recently detected in the groundwater at levels exceeding current MCLs, and based on the number of potential receptors" [2].

On January 31, 1992, the NHDES informed K.J. Quinn that "based on the analytical data provided, groundwater treatment will no longer be required. The groundwater treatment system may be dismantled." NHDES required that K.J. Quinn sample the recovery well in February 1992 and February 1993 [19].

On April 13, 1993, the NHDES informed K.J. Quinn that "all sources of groundwater contamination at the subject site discovered during the site investigation have been eliminated and ambient groundwater standards are being met throughout the site." The NHDES further said that "DES will not require additional investigation, remedial measures, or groundwater monitoring at this time" [18].

During construction at the site in August of 1993, an excavator encountered a 2000-pound chunk of solidified urethane resin. On September 15, 1993 Weston Inc.excavated five test pits on site, collected bottom and side wall soil samples from the pit from which the urethane resin was removed, and analyzed the samples for VOCs in accordance with EPA Method 8020. One estimated detection of carbon disulfide was reported in one sample at below the reporting limit. Weston concluded, "It appears that the soils in the vicinity of the occurence of the urethane resin have not been impacted" [20].

All of Seabrook, and most of Salisbury, Massachusetts and Hampton Falls, New Hampshire are located within 4 miles of the site. In addition, small portions of Amesbury, Massachusetts and South Hampton, Kensington, and Hampton, New Hampshire are located within the site's 4-mile radius. The municipal wells for Salisbury and Seabrook are located within the 4-mile radius of K. J. Quinn. A total population of approximately 17,566 is served by public and private groundwater supply sources within a four-mile radius of the K.J. Quinn site. [35, 36]

There are 35 workers on site for one daily shift at K.J. Quinn [8]. According to the CENTRACTS report, there is a population of approximately 28,325 within a four-mile radius of the site [35, 36]. Sincie the site is in the vicinity of a coastal resort area, the population varies greatly with the summer season. The nearest residence is located approximately 200 feet east of the site property [2, 8].

There are no known terrestrial sensitive environments located on the site. Wetlands are present in the four-mile radius around the K.J. Quinn site.

There have been no reported releases of hazardous substances to the air at the K.J. Quinn site. No readings above background were detected by personal air monitoring conducted during the S&W site reconnaissance on May 8, 1995. No other known air monitoring has been performed at the K.J. Quinn site.

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ATTACHMENT A

K.J. Quinn

Public Water Supplies within a Four-Mile Radius of K.J. Quinn, Seabrook, NH

Attachment B

Environmental FirstSearch Report
New England DataMap Technology Corporation

04-24-95

ATTACHMENT C

K.J. Quinn

NH Non-game and Endangered Species
Potential Occurrence and Habitats